



GR 97 P 1593 P

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : Andreas Lenniger et al.

Applic. No. : 09/436,598

Filed : November 9, 1999

Title : Power Semiconductor Module With Ceramic Substrate

Examiner : David E. Graybill

Group Art Unit : 2814

P R E L I M I N A R Y R E S P O N S E

Hon. Commissioner of Patents and Trademarks,
Washington, D. C. 20231

S i r :

Preliminary to continued examination and responsive to the final Office action dated March 2, 2001, the following remarks are made:

Reconsideration of the application is requested.

Claims 1 to 7 remain in the application.

On pages 1 and 2 of the above-identified Office action, claims 1 and 3 to 6 have been rejected as being fully anticipated by applicants' admitted prior art under 35 U.S.C. § 102.

As will be explained below, it is believed that the claims were patentable over the cited art in their original form and, therefore, the claims have not been amended to overcome the references.

Before discussing the prior art in detail, it is believed that a brief review of the invention as claimed, would be helpful. Claim 1 calls for, *inter alia*, a power semiconductor module, including:

terminal elements for providing external terminals press-fitted into connecting element openings in a plastic housing.

The press-fitting of the invention of the instant application is configured to create a reliable bonding connection in the interior of the housing without encapsulation of the terminal elements by injection molding.

Claim 1 does not solely deal with the simple press-fitting of the terminal elements, but rather with the combination of the press-fitting with the reliable bonding capability of the

terminal elements in the interior. What is new with respect to the invention of the instant application, is that the terminal elements do not have to be encapsulated by injection molding of plastic. Rather, they are fixed suitably by the press-fitting.

Hitherto, metal parts, for example, copper parts, were injection-molded into a plastic frame. As such, separate injection-molding tools were necessary, in which, prior to each injection-molding process, the metal parts were inserted and subsequently encapsulated by the injection molding. The prior art fastened aluminum wires on the injection-molded metal parts in a subsequent fabrication step by ultra-sound soldering techniques (bonds), for example, where the wires served as the electrical connection in the interior of the module.

The man-made injection molding material of the prior art, however, had, and continues to have, the disadvantageous characteristic of shrinking when cooling off after the injection molding. This shrinkage leads to loosening of the metal strips (i.e., they are not completely anchored) in the plastic, i.e., the plastic melts away from the metal parts.

The invention of the instant application, however, eliminates the encapsulation of such metal parts by plastic injection

molding. Thus, the plastic injection-molding process for creating the frame is simplified. In the invention of the instant application, the metal parts are separately produced and are press-fitted immediately prior to bonding in corresponding grooves in the plastic frame. The grooves in the plastic frame and the corresponding metal parts are shaped such that the metal parts are guided in the groove in a narrow manner and are secured against pulling out by corresponding barbs. Accordingly, the anchoring of the metal parts in the plastic frame is substantially improved to make the bonding as reliable as possible.

Claim 2 of the instant application adds lugs to hold the terminal elements in position. In this embodiment, a force-locking connection between the plug and the frame is created. It is this force-locking connection that makes possible the reliable bonding capability of the terminal elements.

In contrast, the "lug" 10 of cited reference solely serves only as a "loose" failure protection. In other words, it prevents the part from becoming removed. Furthermore, the safe bonding capability is only obtained by a combination of the "lug" with an appropriate spring of the terminal elements.

Clearly, applicants' admitted prior art does not show the press-fit feature as recited in claim 1 of the instant application.

It is accordingly believed to be clear that none of the references, whether taken alone or in any combination, either show or suggest the features of claim 1. Claim 1 is, therefore, believed to be patentable over the art. The dependent claims are believed to be patentable as well because they all are ultimately dependent on claim 1.

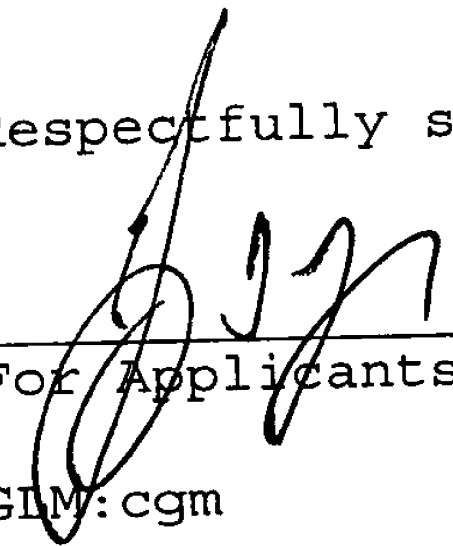
Insofar as claims 2 and 7 are ultimately dependent upon claim 1, and due to the fact that claim 1 is believed to be allowable, these dependent claims are believed to be allowable as well. Thus, the rejection of claims 2 and 7 on page 3 of the final Office action under Section 103 is now moot.

In view of the foregoing, reconsideration and allowance of claims 1 to 7 are solicited.

In the event the Examiner should still find any of the claims to be unpatentable, counsel would appreciate receiving a telephone call so that, if possible, patentable language can be worked out.

Please charge any fees that might be due with respect to
Sections 1.16 and 1.17 to the Deposit Account of Lerner and
Greenberg, P.A., No. 12-1099.

Respectfully submitted,



For Applicants

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